

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appellant : Frank Y. Xu, *et al.*                      Art Unit : 1713  
Serial No. : 10/784,911                      Examiner : Kelechi Chidi Egwim  
Filed : February 23, 2004                      Conf. No. : 6149  
Title : MATERIALS FOR IMPRINT LITHOGRAPHY

**Mail Stop Appeal Brief - Patents**  
Commissioner for Patents  
P.O. Box 1450  
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**APPEAL BRIEF**

**I. REAL PARTIES-IN-INTEREST**

The real parties-in-interest are Molecular Imprints, Inc. and Board of Regents, The University of Texas System, who are the assignees of the entire right and interest in the present Application.

**II. RELATED APPEALS AND INTERFERENCES**

There are no appeals or interferences known to Appellants, the Appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**III. STATUS OF CLAIMS**

Claims 1-19 are pending in the Application.  
Claims 1-19 stand rejected.  
Claims 1-19 are being appealed.

**IV. STATUS OF AMENDMENTS**

There were no amendments to the claims or Specification filed after the Final Rejection.

## V. SUMMARY OF THE INVENTION

The present invention of the Application relates generally to imprint lithography, and in particular, to materials for imprint lithography. Application, at para. [0001].

Micro-fabrication involves the fabrication of very small structures, for example, and without limitation, structures having features on the order of micro-meters or smaller. *Id.*, at para. [0002]. One area in which micro-fabrication has had a sizeable impact is in processing of integrated circuits. *Id.* Other areas of development in which micro-fabrication have been employed include biotechnology, optical technology, mechanical systems and the like. *Id.*

An exemplary micro-fabrication technique is a method of imprint lithography to form a relief pattern in a structure. *Id.*, at para. [0003]. This method includes providing a substrate having a transfer layer (typically spin-coated), and covering the transfer layer, in turn, with a low viscosity, polymerizable (typically UV curable) fluid composition (typically in the form of droplets). *Id.* This method further includes mechanically contacting an imprint template or mold having a relief structure with the polymerizable fluid composition wherein the polymerizable fluid composition fills a gap between the imprint template and the substrate and fills the relief structure of the imprint template. *Id.* This method further includes next subjecting the polymerizable fluid composition to conditions to solidify and to polymerize the same (typically, exposing the polymerizable fluid composition to UV to crosslink it), thereby forming a solidified polymeric material on the transfer layer that contains a relief structure complimentary to that of the imprint template. *Id.*

This method includes next separating the imprint template from the substrate to leave solid polymeric material on the substrate, which solid polymeric material includes a relief pattern in the form of the complimentary relief structure. *Id.* The solidified polymeric material and the transfer layer are next subjected to an environment to selectively etch the transfer layer relative to the solidified polymeric material to form a relief image in the transfer layer. *Id.*

The selective adhesion of the solidified polymeric material to different surfaces are typically considered when developing a method and/or a material useful in forming fine-feature relief patterns in the solidified polymeric material. *Id.*, at para. [0004]. The solidified polymeric

material ought to adhere well to the transfer layer on the substrate, and it ought to be easily released from the surface of the imprint template. *Id.* These characteristics are typically referred to as release characteristics, and if they are satisfied, the relief pattern recorded in the solidified polymeric material will not be distorted during separation of the imprint template from the substrate. *Id.*

Claim 1 recites an imprinting material for use in imprint lithography comprising a composition having a viscosity associated therewith and including a surfactant, a polymerizable component, and an initiator responsive to a stimuli to vary the viscosity in response thereto, with the composition, in a liquid state, having a viscosity lower than about 100 centipoises, and a vapor pressure of less than about 20 Torr, and, in a solid cured state, a tensile modulus greater than about 100 MPa, a break stress greater than about 3 MPa, and an elongation at break greater than about 2%.

Claim 1 is described with respect to Figure 4. Material 36a is shown in Figure 4 as being polymerized and cross-linked, forming cross-linked polymer material 36c. *Id.* Cross-linking is shown at points 36b. *Id.*

In addition to the above-described release characteristics, other characteristics have been discovered that can improve the imprinting material for use in imprint lithography, including: (a) low viscosity, for example, and without limitation, a viscosity of 5 centipoise or less, to enable desirable wetting and spreading on the substrate and rapid fill of the features on the imprint template (it is better if the viscosity is sufficiently low so that minimal pressure (for example, and without limitation, a pressure of about 2-4 psi) with minimal or no additional heating to move the imprinting material into features of an imprint template); (b) low vapor pressure so that there is little evaporation (evaporation is a problem since the droplets of imprinting material may be on the order of 80 pico-liters, and this results in droplets having a large ratio between surface area and volume); (c) the use of a suitable initiator to initiate polymerization upon exposure to actinic radiation, *e.g.*, UV radiation, thermal radiation and the like; (d) a monomer component that satisfies the low viscosity characteristics in a liquid state of the composition and provide suitable mechanical strength in a solid cured state of the composition; and (e) silylated monomers to provide the silicon desired to provide etch selectivity. Application, at para. [0027].

Furthermore, it was discovered that macroscopic mechanical properties of a polymerized imprinting material are desired to be taken into consideration when designing an appropriate imprinting material. These include: (a) tensile modulus, for example, and without limitation, of about 100-400 MPa or greater--typically, the higher the better; (b) break stress, for example, and without limitation, of about 3-12 MPa or greater--typically, the higher the better; and (c) elongation at break, for example, and without limitation, of 2% or more. Application, at para. [0028].

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

A. Claims 1-5, 7, and 9-19 stand rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative, 35 U.S.C. 103(a) as being unpatentable as obvious over, U.S. Patent No. 6,174,932 issued to Pacht *et al.* ("*Pacht*").

B. Claims 1-5, 7, and 9-19 stand rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative, 35 U.S.C. 103(a) as being unpatentable as obvious over, U.S. Patent No. 5,149,592 issued to Wojnarowicz ("*Wojnarowicz*").

C. Claims 1-19 stand rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative, 35 U.S.C. 103(a) as being unpatentable as obvious over, U.S. Patent No. 6,060,530 to Chaouk, *et al.* ("*Chaouk '530*"); U.S. Patent No. 6,015,609 to Chaouk, *et al.* ("*Chaouk '609*"); U.S. Patent No. 6,160,030 to Chaouk, *et al.* ("*Chaouk '030*"); or U.S. Patent No. 6,225,367 to Chaouk, *et al.* ("*Chaouk '367*") (collectively the "*Chaouk patents*").

## **VII. ARGUMENTS**

### **A. 35 U.S.C. §102(b) Rejections And Alternative §103(a) Rejections Over *Pacht***

Appellants traverse the rejections of Claims 1-5, 7, and 9-19 under §102(b) as anticipated by *Pacht*, and alternatively obvious, over *Pacht*.

Anticipation requires each and every element of the claim to be found within the cited prior art reference. *See W.L. Gore & Assocs. v. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed.

Cir. 1983). *Pachl* fails to disclose each and every element of any of Claims 1-5, 7, and 9-19; thus each of these claims are not anticipated by this reference.

Furthermore, the Examiner has not established a *prima facie* case of obviousness, and thus, for this reason alone, each of these claims are patentable over *Pachl*. Additionally, the disclosure of *Pachl* teaches away from making compositions of the imprinting material, as required within the claims of the present Application.

1. Claim 1

a. **Anticipation**

In the Office Action mailed March 22, 2006 ("March 22, 2006 Office Action"), Examiner stated:

Each of *Pachl et al.*...*Wojnarowicz*... and *Chaouk et al.*... teach a curable composition comprising an acrylate monomer, a fluorinated surfactant and a photoinitiator.

While the prior art may not expressly teach the disclosed properties of the claimed composition and the resulting cured product, it is reasonable that the compositions of the prior art would possess the presently claimed properties since the composition [*sic*] are essentially the same as the claimed composition and the USPTO does not have at its disposal the tools or facilities deemed necessary to make physical determinations of the sort. In any event, an otherwise old composition is not patentable regardless of any new or unexpected properties or applications....

March 22, 2006 Office Action, at 4.

In the above quoted statement, Examiner admitted that *Pachl* (as well as other prior art further discussed below) do not expressly teach the disclosed properties of the claimed imprinting materials. *Id.* For instance, *Pachl* does not expressly disclose an imprinting material, that, in a liquid state, has a viscosity lower than about 100 centipoises and a vapor pressure of less than about 20 Torr, and, in a solid cured state, has a tensile modulus of greater than about 100 MPa, a break stress of greater than about 3 MPa, and an elongation at break of greater than about 2%. These are expressed limitations of Claim 1 (and from which the remaining claims depend).

Because of this absence of these recited elements, the Examiner has asserted that these features are "inherent" in the compositions disclosed in *Pachl*. *Id.*; see also Final Office Action, mailed August 24, 2006 ("August 24, 2006 Final Office Action"), at 3. To take such a position, the Examiner must present a basis supporting *Pachl* possessed these inherent features. In this case, the Examiner has not presented such a basis. For that reason alone, these rejections must be withdrawn. Furthermore, the Examiner could not present such a basis about this supposed inherent nature of the compositions disclosed in *Pachl*, because there is evidence reflecting such compositions of *Pachl* lack the claimed combination of features.

i. There Is No Basis Supporting The Compositions Disclosed in *Pachl* Possessed The Combination of Features Required By The Claims

Respecting alleged inherent features, the fact that a certain result or characteristic *may* occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); *In re Oetrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). Also, "[a]n invitation to investigate is not an inherent disclosure" where a prior art reference "discloses no more than a broad genus of potential applications of its discoveries." *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1367, 71 USPQ2d 1081, 1091 (Fed. Cir. 2004) (explaining that "[a] prior art reference that discloses a genus still does not inherently disclose all species within that broad category" but must be examined to see if a disclosure of the claimed species has been made or whether the prior art reference merely invites further experimentation to find the species). See MPEP § 2112 IV.

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent

characteristic *necessarily* flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

In the March 22, 2006 Office Action and again in the August 24, 2006 Final Office Action, Examiner failed to provide any basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristics *necessarily* flow from the teachings of *Pachl* (or the other applied prior art). Rather, Examiner has attempted to establish inherency by possibilities. For instance, in the August 24, 2006 Final Office Action, Examiner stated:

Regarding the argument that the prior art do not teach the recited properties [*sic*]..., these are properties that would be inherent in the composition itself. It is still reasonable that the compositions of the prior art would possess the presently claimed properties since the composition of the prior art are [*sic*] essentially the same as the claimed composition....

August 24, 2006 Final Office Action, at 3.

The composition disclosed in *Pachl*, as well as the compositions disclosed in the other cited prior art, is not "essentially the same as the claimed composition." They are chemically distinct materials from those disclosed in the present Application. *Pachl* teaches a composition comprising or consisting essentially of at least one epoxy, at least one polyol, at least one thickener or filler, one or more suitable photoinitiators and optionally at least one monomer and/or phenoxy resin. *Pachl*, col. 2, ll. 6-10. The composition of Claim 1 and its dependent claims are not required to include at least one epoxy, at least one polyol, or at least one thickener or filler. It is, therefore, unreasonable to contend that these are essentially the same compositions, and that the compositions of *Pachl* would necessarily possess the presently claimed properties. It is even more unreasonable to contend that such a composition would inherently possess *all* of the characteristics specified within the claims.

Examiner has not shown rationale or evidence tending to show inherency. Without rationale or evidence tending to show inherency from Examiner, the burden to show a difference cannot be shifted to Applicants. Therefore, lack of basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art means that the characteristics of the composition as specified within the claims are not inherently possessed by the compositions of *Pachl*.

As noted above, for this reason alone, these rejections under § 102(b) are without basis and must be withdrawn.

ii. Rather, *Pachl* Reflects That Its Disclosed Compositions Do Not Have The Combination of Features Required By The Claims

Furthermore, the teachings of *Pachl* reflect that its disclosed compositions do not possess the combinations of features recited in the claims.

For instance, one of several features of Claim 1 of the present Application is that the composition of the claimed invention, in a liquid state, has a viscosity lower than about 100 centipoises. As reflected in *Pachl*, the compositions disclosed therein have much greater viscosities, well beyond this limit.

*Pachl* teaches a composition comprising or consisting essentially of at least one epoxy, at least one polyol, **at least one thickener or filler**, one or more suitable photoinitiators and optionally at least one monomer and/or phenoxy resin. *Pachl*, col. 2, ll. 6-10 (emphasis added). Regarding the thickener, *Pachl* states: "While any suitable thickener can be employed fumed or aerosil silica can be used to obtain desirable results." *Pachl*, col. 3, ll. 9-11. (Appellants note that the particulate nature of these thickeners is incompatible with imprinting material required for imprint lithography.) *Pachl* further states: "The thickener is typically non-reactive and employed to create a thixotropic fluid, e.g., having a viscosity of about 20,000 to 80,000 centipoise." *Pachl*, col. 3, ll. 13-16. The thixotropic fluid of *Pachl* does not satisfy the requirement of Claim 1 of a composition having a viscosity of lower than about 100 centipoise.

Examples 1-7, 9, and 11-13 of *Pachl* describe preparation or use of compositions including silica (Cab-O-Sil) as a filler or thickener. *Pachl*, col. 10, l. 54 – col. 18, l. 9. Brookfield viscosity data for three compositions are tabulated in Example 9. The viscosities are reported for Gels A, B, and C measured at 20°C using a number 6 spindle as a function of revolutions per minute (RPM). The viscosities of Gels A, B, and C range from 4,880 cps at 100 RPM to 436,000 cps at 0.5 RPM. *Pachl*, col 15, ll. 39-55. Examples 8 and 10 of *Pachl* do not disclose addition of a thickener. Example 10 discloses a curable foam; no viscosity data is reported. *Pachl*, col. 15, l. 57 – col. 16, l. 7. Example 8 discloses a composition including cyclaliphatic epoxy, polyester polyol, sulfonium salt, and fluorinated surfactant. The Brookfield



viscosity for this composition is reported as 300-400 cps at 20°C, which exceeds the required viscosity of Claim 1. *Pachl*, col. 14, ll. 1-31.

Examiner does not dispute that *Pachl* discloses compositions that have viscosities above the limit required by the claim. Rather, the Examiner appears to try to avoid this particular claim feature by stating:

Regarding the arguments about the viscosity recited in the claims, applicant has not provided a temperature at which the viscosities are to be measured and the claims recited that the viscosity is variable. Each of the prior art compositions would be at the recited viscosity at some given temperature.

August 24, 2006 Final Office Action, at 3.

Appellants do not agree with this statement.

Contrary to Examiner's statement, the Application *does* provide a temperature at which viscosities are to be measured, namely ambient temperature. The Application states: "when designing an imprinting material for use in imprint lithography, further considerations include: (a) low viscosity, for example, and without limitation, a viscosity of 5 centipoise or less, to enable desirable wetting and spreading on the substrate and rapid fill of the features on the imprint template...*with minimal or no additional heating* to move the imprinting material into features of the imprint template)." *Id.*, (emphasis added). In view of this statement from the Application, Appellants maintain that the viscosities refer to viscosity measurements at ambient temperature. Appellants further note that *Pachl* also discloses applying a composition at ambient temperature. *Pachl*, col. 17, ll. 44-45.

Appellants note that, while the viscosities of some materials are quite sensitive to temperature, and a relatively small temperature variation can, in some instances, result in a significant change in viscosity, the viscosities of other materials are relatively insensitive to temperature. Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that "[e]ach of the prior art compositions would be at the recited viscosity at some given temperature." August 24, 2006 Final Office Action, at 3.

Additionally, Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that the vapor pressure, tensile modulus, break stress, and elongation at break of the composition disclosed by *Pachl* would possess the presently claimed values. This is particularly true in the present instance because Claim 1 requires the combination of each of

these limitations in the composition. For instance, if, as the Examiner suggests, the temperature could be raised to a temperature at which the viscosity of the composition becomes less than 100 centipoise, the vapor pressure (which is required to be lower than 20 Torr) must be also measured at this elevated temperature.

In sum, these required characteristics are not inherently possessed by *Pachl*. Accordingly, Claim 1 is not anticipated by *Pachl*.

**b. Obviousness**

In the March 22, 2006 Office Action, Examiner stated:

Even if assuming that the prior art references do not meet the requirements of 35 U.S.C. 102, it would still have been obvious to one of ordinary skill in the art, at the time the invention was made, to arrive at the same inventive composition because the disclosure of the inventive subject matter appears within the generic disclosure of the prior art.

March 22, 2006 Office Action, at 4.

As noted above, and as admitted to by Examiner, *Pachl* does not expressly disclose an imprinting material, that, in a liquid state, has a viscosity lower than about 100 centipoises and a vapor pressure of less than about 20 Torr, and, in a solid cured state, has a tensile modulus of greater than about 100 MPa, a break stress of greater than about 3 MPa, and an elongation at break of greater than about 2%. Each of these are expressed limitations of Claim 1 (and from which the remaining claims depend).

As further shown above (Section VII.A.1.a), *Pachl* does not inherently possess these features and thus does not anticipate the claimed invention. As an alternative to this "inherency" contention, the Examiner has thus taken the position that the claimed invention would have been obvious. March 22, 2006 Office Action, at 4.

To establish a *prima facie* case of obviousness under § 103(a), three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's

disclosure. See M.P.E.P. 706.02(j); see also *In re Vaack*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

i. The Claimed Combination Of Limitations Are Not Taught or Suggested by *Pachl*

*Pachl* does not teach or suggest all of the claim limitations. As discussed above and in Section VII.A.1.a, the combination of features of the claims for each of the claims are not disclosed (expressly or inherently) in *Pachl*. Therefore, for that reason alone, these § 103(a) rejections are improper and must be withdrawn.

ii. There is No Motivation Or Suggestion To So Modify *Pachl*

Furthermore, there is no suggestion or motivation to modify *Pachl* to make the claimed invention. Because the absent combination of features are not expressly or inherently disclosed, it is dubious that there is any suggestion or motivation to modify *Pachl* in that regard. To the contrary, the only suggestion and motivation in *Pachl* teaches away from the claimed invention. For instance, *Pachl* expressly teaches additional methods to *increase* the viscosity of the composition. *Pachl* states: "The viscosity of the uncured composition can also be increased by introducing a solid epoxy in addition to or as a replacement for the aforementioned epoxies.... The viscosity can be tailored to be similar to paint, or increased to a grease or paste-like consistency. *Pachl*, col. 6, ll. 51-58. Related to viscosity, *Pachl* states: "While the dimensional thickness of the inventive composition can be tailored to satisfy a wide range of end-uses, normally the composition is applied at a thickness of about 0.05 mm to about 10 mm thick, e.g., in the case of roof ditch the composition is about 5 mm thick. The ability of the inventive composition to form such relatively thick layers is in contrast to conventional practices and a marked improvement." *Pachl*, col. 6, l. 63 – col. 7, l. 3.

*Pachl* further states: "The previously described compositions can be modified to obtain a gel consistency by adding a gelling agent.... *By employing a gelling agent, the viscosity and handling characteristics of the inventive composition can be improved, e.g., the composition can be tailored to possess a putty or caulk-like consistency.*" *Pachl*, col. 9, ll. 4-16 (emphasis added).

Thus, *Pachl* teaches improving the viscosity characteristics of the composition by increasing the viscosity. As such, there cannot be any suggestion or motivation to modify *Pachl* to *decrease* its viscosity lower than 100 centipoise, as required by the claims.

There is no motivation of suggestion to modify *Pachl* to make the imprint material of Claim 1. Rather, *Pachl* teaches away from the claimed invention by teaching increasing composition viscosities (which are already well above 100 centipoise). Because the claims require, among other things, that the composition of the invention composition, in a liquid state, has said viscosity being lower than about 100 centipoises, *Pachl* teachings are the antithesis of a suggestion or a motivation to modify *Pachl* as the Examiner proposes.

Accordingly, Claim 1 is alternatively not unpatentable as obvious over *Pachl*.

2. Claim 2

Claim 2 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a non-ionic surfactant. Thus, Claim 2 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 2 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

3. Claim 3

Claim 3 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated surfactant. Thus, Claim 3 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 3 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

4. Claim 4

Claim 4 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated non-ionic surfactant. Thus, Claim 4 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently

discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 4 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

5. Claim 5

Claim 5 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group consisting of epoxies, acrylates, methacrylates, and vinyl ethers. Thus, Claim 5 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 5 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

6. Claim 7

Claim 7 recites the imprinting material as recited in Claim 1 wherein the monomer is a substituted acrylate. Thus, Claim 7 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 7 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

7. Claim 9

Claim 9 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group of substituted acrylates consisting of mono-substituted acrylates and multifunctional-substituted acrylates. Thus, Claim 9 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these

additional reasons. Claim 9 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**8. Claim 10**

Claim 10 recites the imprinting material as recited in Claim 1 wherein the initiator is selected from the group consisting of photo initiators and thermal initiators. Thus, Claim 10 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 10 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**9. Claim 11**

Claim 11 recites the imprinting material as recited in Claim 1 wherein the initiator is a radical photoinitiator. Thus, Claim 11 further limits a component of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 11 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**10. Claim 12**

Claim 12 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 25 centipoises. Thus, Claim 12 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this viscosity (and rather *Pachl* teaches away from this viscosity) and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 12 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**11. Claim 13**

Claim 13 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 10 centipoises. Thus, Claim 13 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this viscosity (and rather *Pachl* teaches away from this viscosity) and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 13 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**12. Claim 14**

Claim 14 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 5 centipoises. Thus, Claim 14 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this even lower viscosity in combination with the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this viscosity (and rather *Pachl* teaches away from this viscosity) and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 14 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**13. Claim 15**

Claim 15 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 5 Torr. Thus, Claim 15 further limits the vapor pressure of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 15 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**14. Claim 16**

Claim 16 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 2 Torr. Thus, Claim 16 further limits the vapor pressure of the composition

recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 16 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**15. Claim 17**

Claim 17 recites the imprinting material as recited in Claim 1 wherein the tensile modulus is 100 MPa or greater. Thus, Claim 17 further limits the tensile modulus of the solid cured state of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this more limited tensile modulus in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this tensile modulus and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 17 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**16. Claim 18**

Claim 18 recites the imprinting material as recited in Claim 1 wherein the break stress is about 3 MPa or greater. Thus, Claim 18 further limits the break stress of the solid cured state of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this more limited break stress in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this break stress and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 18 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

**17. Claim 19**

Claim 19 recites the imprinting material as recited in Claim 1 wherein the elongation at break is 8% or more. Thus, Claim 19 further limits the elongation at break of the solid cured state of the composition recited in Claim 1. There is nothing in *Pachl* that expressly discloses or inherently discloses this greater elongation at break in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Pachl* to this elongation break and



the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 19 is not anticipated by *Pachl* and, alternatively, is not unpatentable as obvious over *Pachl*.

Appellants respectfully request withdrawal of the 35 U.S.C. §102(b) rejections and the alternative 35 U.S.C. §103(a) rejections of Claims 1-5, 7, and 9-19 over *Pachl*.

**B. 35 U.S.C. §102(b) Rejections over *Wojnarowicz***

Appellants likewise traverse the rejection of Claims 1-5, 7, and 9-19 under 35 U.S.C. §102(b) as anticipated by *Wojnarowicz*. *Wojnarowicz* fails to disclose each and every element of any of Claims 1-5, 7, and 9-19; thus each if these claims are not anticipated by this reference.

Furthermore, the Examiner has not established a *prima facie* case of obviousness, and thus, each of these claims are patentable over *Wojnarowicz*.

**1. Claim 1**

**a. Anticipation**

Examiner's assertions for rejecting these claims under *Wojnarowicz* are identical to the assertions made when rejecting *Pachl*. March 22, 2006 Office Action, at 4; *see also* Section VII.A above.

And, for the same reasons as recited in Section VII.A.1.a above, Applicants note that the Examiner has again not presented a basis supporting *Wojnarowicz* inherently possessed the features of Claim 1. For this reason alone, these rejections must be withdrawn.

**i. There Is No Basis Supporting the Compositions Disclosed in *Wojnarowicz* Possessed The Combination of Features Required By The Claims**

Similar to Section VII.A.1.a for *Pachl*, Examiner failed to provide basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of *Wojnarowicz* or the other applied prior art. Rather, the Examiner has still attempted to establish inherency by possibilities.

And just like with Examiner's assertions regarding *Pachl*, the compositions disclosed in *Wojnarowicz* are not "essentially the same as the claimed composition." They too are chemically distinct material from those disclosed in the present Application.

*Wojnarowicz* teaches a composition comprising or consisting essentially of "at least one aliphatic urethane diacrylate normally provided as an oligomer and at least one monofunctional monomer, preferably saturated aliphatic or cycloaliphatic acrylate or methacrylate and most preferably a monofunctional aliphatic urethane acrylate." *Wojnarowicz*, col. 3, ll. 26-32. The composition of Claim 1 and its dependent claims are not required to include at least one at least one aliphatic urethane diacrylate normally provided as an oligomer. It is therefore unreasonable to contend that these are essentially the same compositions, and that the compositions of *Wojnarowicz* would necessarily possess the presently claimed properties.

Examiner has not shown rationale or evidence tending to show inherency. Without rationale or evidence tending to show inherency from Examiner, the burden to show a difference cannot be shifted to Applicants. Therefore, this lack of basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art.

ii. *Wojnarowicz* Reflects That Its Disclosed Compositions Do Not Have The Combination of Features Required By The Claims

Furthermore, the teachings of *Wojnarowicz* reflect that its disclosed compositions do not possess the combination of features recited in the claims.

For instance, one of several features of Claim 1 of the present Application is the composition of the claimed invention, in a liquid state, has a viscosity lower than about 100 centipoises. As reflected in *Wojnarowicz*, components of the compositions disclosed therein have much greater viscosities that are well beyond this limit.

In Item 6 of the August 24, 2006 Final Office Action, Examiner states: "the viscosities recited for *Wojnarowicz* are at from 150° to 160° F. At 25° F, the viscosity is 20 to 50 cP (20-50mPa.s). See claim 3 in *Wojnarowicz*." August 24, 2006 Final Office Action, at 3.

This statement is flawed.

Claim 3 of *Wojnarowicz* recites the viscosity of the aliphatic urethane acrylate, which accounts for 20-60% by weight of the polymer component *Wojnarowicz* recites in Claim 1. *Wojnarowicz* actually states:

Preferably, the backbone polymer comprising a total of from about 40 to about 80 percent by weight, preferably about 50 to about 70 percent by weight,

aliphatic urethane acrylate preferably having a molecular weight in the range of about 1000 to about 3000 and a viscosity of about 1000 to about 15,000 centipoise at about 150° F.

The presently preferred aliphatic urethane acrylates are oligomers such as Ebecryl® 8806, having an average molecular weight of about 2,000 and a viscosity of about 10,500 centipoise, at 150° F and manufactured and sold by Radeure Specialties, Inc. and Photomer® 6210 an aliphatic urethane acrylate oligomer having a molecular weight of about 1400, a viscosity of about 1500 centipoise at about 160° F and manufactured and sold by Henkel Corporation.

The second component of the backbone is at least one monofunctional substituted or unsubstituted aliphatic or cycloaliphatic acrylate or methacrylate including acrylate and methacrylate functional urethane containing typically from 2 to about 10 carbon atoms in the acrylate or methacrylate group.... The second component is present in a total concentration of about 20 to about 60, preferably about 30 to about 50 percent by weight based on the mixture of the reactive components. The presently preferred monofunctional acrylate is Genomer® M220 a monofunctional aliphatic urethane acrylate having a molecular weight of 215 and a viscosity of 20-50 mPa.s at 25°C which is sold by Hans Rahn and Company of Zurich.

*Wojnarowicz*, col. 3, l. 40 — col. 4, l. 5.

Thus, the composition described by *Wojnarowicz* includes at least 40% by weight of at least one aliphatic urethane acrylate having a molecular weight of at least 1000 and a viscosity of at least about 1000 cps at 150°F, and at most 60% by weight of at least one monofunctional substituted or unsubstituted aliphatic or cycloaliphatic acrylate or methacrylate having a viscosity of 20-50 cps at 25°C (*i.e.*, 77°F, not 25°F, as stated by Examiner).

The viscosity of a liquid generally increases as temperature decreases. Therefore, at ambient conditions, the viscosity of the aliphatic urethane acrylate is expected to exceed the minimum value (1000 cps) recited at 150°F. For example, Photomer® 6210, which *Wojnarowicz* reports as having a viscosity of 1500 cps at about 160°F (*Wojnarowicz*, col. 3, ll. 50-54), has a viscosity of about 11,000 cps at 25°C.

A person of ordinary skill in the art of the present Application would understand that the properties of a mixture are not generally predicable based on properties of components of the mixture. It is not inherent that the viscosity of the mixture falls within the requirement of the claims.

Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that the viscosity of the composition of *Wojnarowicz* would satisfy the requirement of Claim 1. Additionally, Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that the vapor pressure, tensile modulus, break stress, and elongation at break of the composition disclosed by *Wojnarowicz* would possess the presently claimed properties of Claim 1.

In sum, the required characteristics are not inherently possessed by *Wojnarowicz*. Accordingly, Claim 1 is not anticipated by *Wojnarowicz*.

**b. Obviousness**

Again, as noted in the March 22, 2006 Office Action, Examiner has rejected these claims as obvious over *Wojnarowicz*. March 22, 2006 Office Action, at 4.

As noted above, and as admitted to by Examiner, *Wojnarowicz* does not expressly disclose an imprinting material, that, in a liquid state, has a viscosity lower than about 100 centipoises and a vapor pressure of less than about 20 Torr, and, in a solid cured state, has a tensile modulus of greater than about 100 MPa, a break stress of greater than about 3 MPa, and an elongation at break of greater than about 2%. Each of these are expressed limitations of Claim 1 (and from which the remaining claims depend).

As further shown above (Section VII.B.1.a), *Wojnarowicz* does not inherently possess these features and thus does not anticipate the claimed invention. As an alternative to this "inherency" contention, the Examiner has taken the position that the claimed invention would have been obvious. March 22, 2006 Office Action, at 4.

**i. The Claimed Combination of Limitations Are Not Taught Or Suggested By *Wojnarowicz***

*Wojnarowicz* does not teach or suggest all of the claim limitations. As discussed above and in Section VII.B.1.a, multiple features of the claims are not disclosed (expressly or inherently) in *Wojnarowicz*. Therefore, and for that reason alone, these § 103(a) rejections are improper and must be withdrawn.

b. There Is No Motivation Or Suggestion To So Modify  
Wojnarowicz

Furthermore, there is no suggestion or motivation to modify *Wojnarowicz* to make the claimed invention. Of course, because the absent combination of features are not expressly or inherently disclosed, it is dubious that there is any suggestion or motivation to modify *Wojnarowicz* in that regard.

Accordingly, Claim 1 is not unpatentable as obvious over *Wojnarowicz*.

2. Claim 2

Claim 2 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a non-ionic surfactant. Thus, Claim 2 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 2 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

3. Claim 3

Claim 3 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated surfactant. Thus, Claim 3 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 3 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

4. Claim 4

Claim 4 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated non-ionic surfactant. Thus, Claim 4 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1.

Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 4 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**5. Claim 5**

Claim 5 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group consisting of epoxies, acrylates, methacrylates, and vinyl ethers. Thus, Claim 5 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 5 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**6. Claim 7**

Claim 7 recites the imprinting material as recited in Claim 1 wherein the monomer is a substituted acrylate. Thus, Claim 7 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 7 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**7. Claim 9**

Claim 9 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group of substituted acrylates consisting of mono-substituted acrylates and multifunctional-substituted acrylates. Thus, Claim 9 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and

the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 9 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

8. **Claim 10**

Claim 10 recites the imprinting material as recited in Claim 1 wherein the initiator is selected from the group consisting of photo initiators and thermal initiators. Thus, Claim 10 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 10 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

9. **Claim 11**

Claim 11 recites the imprinting material as recited in Claim 1 wherein the initiator is a radical photoinitiator. Thus, Claim 11 further limits a component of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 11 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

2. **Claim 12**

Claim 12 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 25 centipoises. Thus, Claim 12 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1

and for these additional reasons, Claim 12 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**3. Claim 13**

Claim 13 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 10 centipoises. Thus, Claim 13 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 13 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**4. Claim 14**

Claim 14 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 5 centipoises. Thus, Claim 14 further limits the viscosity of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 14 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**13. Claim 15**

Claim 15 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 5 Torr. Thus, Claim 15 further limits the vapor pressure of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 15 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.



**14. Claim 16**

Claim 16 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 2 Torr. Thus, Claim 16 further limits the vapor pressure of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 16 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**15. Claim 17**

Claim 17 recites the imprinting material as recited in Claim 1 wherein the tensile modulus is 100 MPa or greater. Thus, Claim 17 further limits the tensile modulus of the solid cured state of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this more limited tensile modulus in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this tensile modulus and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 17 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**16. Claim 18**

Claim 18 recites the imprinting material as recited in Claim 1 wherein the break stress is about 3 MPa or greater. Thus, Claim 18 further limits the break stress of the solid cured state of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this more limited break stress in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this break stress and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 18 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

**17. Claim 19**

Claim 19 recites the imprinting material as recited in Claim 1 wherein the elongation at break is 8% or more. Thus, Claim 19 further limits the elongation at break of the solid cured

state of the composition recited in Claim 1. There is nothing in *Wojnarowicz* that expressly discloses or inherently discloses this greater elongation at break in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify *Wojnarowicz* to this elongation break and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 19 is not anticipated by *Wojnarowicz* and, alternatively, is not unpatentable as obvious over *Wojnarowicz*.

Therefore, Appellants respectfully request withdrawal of the 35 U.S.C. §102(b) rejections and the alternative 35 U.S.C. §103(a) rejections of Claims 1-5, 7, and 9-19 over *Wojnarowicz*.

**C. 35 U.S.C. §102(b) Rejections over Chaouk**

Appellants likewise traverse the rejection of Claims 1-19 under 35 U.S.C. §102(b) as anticipated by the *Chaouk* patents. The *Chaouk* patents fail to disclose each and every element of any of Claims 1-19; thus each of these claims are not anticipated by these references.

Furthermore, the Examiner has not established a *prima facie* case of obviousness, and, thus, each of these claims are patentable over the *Chaouk* patents.

Appellants note that the Examiner has grouped the *Chaouk* patents together as a single §102(b)/§103(a) rejection. Since *Chaouk* '609, *Chaouk* '530, and *Chaouk* '030 share a common filing date and appear to disclose the same inventions, and *Chaouk* '367 appears to be very closely related, Appellants have responded to the Examiner's combined rejection by presenting combined arguments.

**I. Claim 1**

**a. Anticipation**

Examiner's assertions for rejecting these claims under *Chaouk* are identical to the assertions made when rejecting *Pachl* and *Wojnarowicz*. March 22, 2006 Office Action, at 4: *see also* Sections VII.A and VII.B above.

And for the same reasons as recited in Sections VII.A.1.a and VII.B.1.a above, Applicants note that the Examiner has again not presented a basis supporting the *Chaouk* patents inherently possessed the features of Claim 1. For this reason alone, these rejections must be withdrawn.

i. There Is No Basis Supporting the Compositions Disclosed in The *Chaouk* Patents Possessed The Combination of Features Required By The Claims

Similar to Sections VII.A.1.a and VII.B.1.a for *Pachl* and *Wojnarowicz*, respectively, Examiner failed to provide basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the *Chaouk* patents or the applied prior art. Rather, the Examiner has attempted to establish inherency by possibilities.

The compositions disclosed in the *Chaouk* patents are not “essentially the same as the claimed composition.” They are chemically distinct material from those disclosed in the present Application. *Chaouk* '609 states “The polymerizable component includes at least one macromonomer having at least one perfluoropolyether unit.” *Chaouk* '609, col. 2, ll. 59-60 (emphasis added). Other *Chaouk* patents teach similar requirements (*Chaouk* '530, Abstract; *Chaouk* '030, Abstract; *Chaouk* '367, Abstract). The composition of Claim 1 is not required to include at least one perfluoropolyether unit. Thus, Examiner's assertion that the compositions of the prior art are essentially the same as the claimed composition is not supported by the *Chaouk* patents. It is therefore unreasonable to contend that these are essentially the same compositions, and that properties of the compositions of the *Chaouk* patents would necessarily possess the presently claimed properties or, specifically, the combination of properties required by the imprinting material for use in imprint lithography in Claim 1.

For example, the *Chaouk* patents describe high water content porous polymers. The physico-chemical properties of compositions used to make high water content porous polymers, and the mechanical properties of such compositions in the solid cured state, are necessarily different than the properties of imprinting material for use in imprint lithography. Specifically, paragraph [0023] of the Application describes mold recessions and protrusions as small as 10 nm. Polymers disclosed by the *Chaouk* patents have pore sizes ranging from 10 nm to about 5  $\mu\text{m}$ , with 100 nm being typical. *Chaouk* '530, col. 10, ll. 52-56. A minimum pore size that is approximately the same as the mold features described in the Application would make the compositions disclosed by the *Chaouk* patents unusable for the desired purpose.

Additionally, the high water content of the porous polymers described by the *Chaouk* patents would result in low mechanical strength—much lower than the tensile modulus of greater than about 100 MPa required by Claim 1. As known by one skilled in the art, in some cases, water content is inversely proportional to tensile modulus of a polymer.

Examiner has not shown rationale or evidence tending to show inherency. Without rationale or evidence tending to show inherency from Examiner, the burden to show an unobvious difference cannot be shifted to Applicants. Therefore, the burden still lies with Examiner to provide basis of fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art.

ii. The *Chaouk* Patents Reflect That Their Disclosed Compositions Do Not Have The Combination of Features Required By The Claims

Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that the properties of the liquid composition and/or the solid cured state of the *Chaouk* patents would satisfy the limitations of Claim 1. Specifically, Examiner has not provided a basis in fact and/or technical reasoning to support the assertion that the viscosity, vapor pressure, tensile modulus, break stress, and elongation at break of the composition disclosed by the *Chaouk* patents would possess the presently claimed properties of Claim 1. Additionally, the general arguments regarding viscosity in Sections VII.A.1.a.ii and VII.B.1.a.ii also apply to the *Chaouk* patents.

In sum, the required characteristics are not inherently possessed in the *Chaouk* patents. Accordingly, Claim 1 is not anticipated by the *Chaouk* patents.

**b. Obviousness**

Again, as noted in the March 22, 2006 Office Action, Examiner has rejected these claims as obvious over the *Chaouk* patents. March 22, 2006 Office Action, at 4.

As noted above, and as admitted to by Examiner, the *Chaouk* patents do not expressly disclose an imprinting material, that, in a liquid state, has a viscosity lower than about 100 centipoises and a vapor pressure of less than about 20 Torr, and, in a solid cured state, has a tensile modulus of greater than about 100 MPa, a break stress of greater than about 3 MPa, and

an elongation at break of greater than about 2%. Each of these are expressed limitations of Claim 1 (and from which the remaining claims depend).

As further shown above (Section VII.C.1.a), the *Chaouk* patents do not inherently possess these features and thus do not anticipate the claimed invention. As an alternative to this "inherency" contention, the Examiner has taken the position that the claimed invention would have been obvious. March 22, 2006 Office Action, at 4.

a. The Claimed Combinations of Limitations Are Not Taught or Suggested by the *Chaouk* patents

The *Chaouk* patents do not teach or suggest all of the claim limitations. As discussed above and in Section VII.C.1.a, multiple features of the claims are not disclosed (expressly or inherently, alone or in combination) in the *Chaouk* patents. Therefore, for that reason alone, these § 103(a) rejections are improper and must be withdrawn.

b. There Is No Motivation Or Suggestion To So Modify The *Chaouk* Patents

Furthermore, there is no suggestion or motivation to modify the *Chaouk* patents to make the claimed invention. Of course, because the absent combination of features are not expressly or inherently disclosed, it is dubious that there is any suggestion or motivation to modify the *Chaouk* patents in that regard.

Accordingly, Claim 1 is not unpatentable as obvious over the *Chaouk* patents.

2. Claim 2

Claim 2 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a non-ionic surfactant. Thus, Claim 2 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 2 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

3. Claim 3

Claim 3 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated surfactant. Thus, Claim 3 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 3 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

4. Claim 4

Claim 4 recites the imprinting material as recited in Claim 1 wherein the surfactant comprises a fluorinated non-ionic surfactant. Thus, Claim 4 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 4 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

5. Claim 5

Claim 5 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group consisting of epoxies, acrylates, methacrylates, and vinyl ethers. Thus, Claim 5 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 5 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

6. Claim 6

Claim 6 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from a set of polymerizable components containing silicon therein. Thus, Claim 6 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 6 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

7. Claim 7

Claim 7 recites the imprinting material as recited in Claim 1 wherein the monomer is a substituted acrylate. Thus, Claim 7 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 7 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

8. Claim 8

Claim 8 recites the imprinting material as recited in Claim 1 wherein the monomer is a silicon-containing acrylate. Thus, Claim 8 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 8 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

9. Claim 9

Claim 9 recites the imprinting material as recited in Claim 1 wherein the monomer is selected from the group of substituted acrylates consisting of mono-substituted acrylates and multifunctional-substituted acrylates. Thus, Claim 9 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 9 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

10. Claim 10

Claim 10 recites the imprinting material as recited in Claim 1 wherein the initiator is selected from the group consisting of photo initiators and thermal initiators. Thus, Claim 10 further limits a component of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 10 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

11. Claim 11

Claim 11 recites the imprinting material as recited in Claim 1 wherein the initiator is a radical photoinitiator. Thus, Claim 11 further limits a component of the composition recited in the *Chaouk* patents that expressly discloses or inherently discloses this further limitation in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to include this limitation and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 11 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.



**12. Claim 12**

Claim 12 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 25 centipoises. Thus, Claim 12 further limits the viscosity of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 12 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**13. Claim 13**

Claim 13 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 10 centipoises. Thus, Claim 13 further limits the viscosity of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 13 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**14. Claim 14**

Claim 14 recites the imprinting material as recited in Claim 1 wherein the viscosity in the liquid state is less than about 5 centipoises. Thus, Claim 14 further limits the viscosity of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this even lower viscosity in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this viscosity and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 14 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**15. Claim 15**

Claim 15 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 5 Torr. Thus, Claim 15 further limits the vapor pressure of the composition

recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 15 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**16. Claim 16**

Claim 16 recites the imprinting material as recited in Claim 1 wherein the vapor pressure is lower than about 2 Torr. Thus, Claim 16 further limits the vapor pressure of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this even lower vapor pressure in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this vapor pressure and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 16 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**17. Claim 17**

Claim 17 recites the imprinting material as recited in Claim 1 wherein the tensile modulus is 100 MPa or greater. Thus, Claim 17 further limits the tensile modulus of the solid cured state of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this more limited tensile modulus in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this tensile modulus and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 17 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**18. Claim 18**

Claim 18 recites the imprinting material as recited in Claim 1 wherein the break stress is about 3 MPa or greater. Thus, Claim 18 further limits the break stress of the solid cured state of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this more limited break stress in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to

this break stress and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 18 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

**19. Claim 19**

Claim 19 recites the imprinting material as recited in Claim 1 wherein the elongation at break is 8% or more. Thus, Claim 19 further limits the elongation at break of the solid cured state of the composition recited in Claim 1. There is nothing in the *Chaouk* patents that expressly discloses or inherently discloses this greater elongation at break in combination with all of the features of Claim 1. Nor is there any motivation or suggestion to modify the *Chaouk* patents to this elongation break and the combination of features in Claim 1. Accordingly, for the reasons presented above for Claim 1 and for these additional reasons, Claim 19 is not anticipated by the *Chaouk* patents and, alternatively, is not unpatentable as obvious over the *Chaouk* patents.

Therefore, Appellants respectfully request withdrawal of the 35 U.S.C. §102(b) rejections and the alternative 35 U.S.C. §103(a) rejections of Claims 1-19 over the *Chaouk* patents.

Please apply the brief fee of \$250 and any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: February 23, 2007



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## CLAIMS APPENDIX

1. An imprinting material for use in imprint lithography comprising: a composition having a viscosity associated therewith and including a surfactant, a polymerizable component, and an initiator responsive to a stimuli to vary said viscosity in response thereto, with said composition, in a liquid state, having said viscosity being lower than about 100 centipoises, a vapor pressure of less than about 20 Torr, and in a solid cured state a tensile modulus of greater than about 100 MPa, a break stress of greater than about 3 MPa and an elongation at break of greater than about 2%.
2. The imprinting material as recited in claim 1 wherein said surfactant comprises a non-ionic surfactant.
3. The imprinting material as recited in claim 1 wherein said surfactant comprises a fluorinated surfactant
4. The imprinting material as recited in claim 1 wherein said surfactant comprises a fluorinated non-ionic surfactant.
5. The imprinting material as recited in claim 1 wherein said monomer is selected from the group consisting of epoxies, acrylates, methacrylates and vinyl ethers.

6. The imprinting material as recited in claim 1 wherein said monomer is selected from a set of polymerizable component containing silicon therein.
7. The imprinting material as recited in claim 1 wherein said monomer is a substituted acrylate.
8. The imprinting material as recited in claim 1 wherein said monomer is a silicon-containing acrylate.
9. The imprinting material as recited in claim 1 wherein said monomer is selected from the group of substituted acrylates consisting of mono-substituted acrylates and multifunctional-substituted acrylates.
10. The imprinting material as recited in claim 1 wherein said initiator is selected from the group of initiators consisting of photo initiators and thermal initiators.
11. The imprinting material as recited in claim 1 wherein said initiator is a radical photoinitiator.

12. The imprinting material as recited in claim 1 wherein said viscosity in said liquid state is less than about 25 centipoises.
13. The imprinting material as recited in claim 1 wherein said viscosity in said liquid state is less than about 10 centipoises.
14. The imprinting material as recited in claim 1 wherein said viscosity in said liquid state is less than about 5 centipoises.
15. The imprinting material as recited in claim 1 wherein said vapor pressure is lower than about 5 Torr.
16. The imprinting material as recited in claim 1 wherein said vapor pressure is lower than about 2 Torr.
17. The imprinting material as recited in claim 1 wherein said tensile modulus is 100 MPa or greater.
18. The imprinting material as recited in claim 1 wherein said break stress of about 3 MPa or greater.

19. The imprinting material as recited in claim 1 wherein said elongation at break is 8% or more.

## EVIDENCE APPENDIX

No evidence was submitted pursuant to §§1.130, 1.131, or 1.132 of 37 C.F.R. or of any other evidence entered by the Examiner and relied upon by Appellants in the Appeal.



Appellant : Xu *et al.*  
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#### RELATED PROCEEDINGS APPENDIX

There are no related proceedings to the current proceeding.